

Pore Water
Characterization –
Delaware Valley Works
Site
Sampling and Analysis Plan

September
2018

I. BACKGROUND

The US Army Corps of Engineers-Philadelphia District (USACE) has developed this *Sampling and Analysis Plan (SAP)* to direct pore water sampling and analysis activities in support of US Environmental Protection Agency, Region 3 (EPA) related to the Delaware Valley Works Site facility, (Site), formerly known as General Chemical and Honeywell in Claymont, Delaware. The Site is currently undergoing remediation and redevelopment into a port facility. Recent site and offsite sampling and investigation has shown that there is a potential for arsenic and pesticides related to the Site's previous use to enter the Delaware River from the Site and/or the adjacent Sunoco Refinery neighboring the Site to the upriver side. Some pore water sampling in the Delaware River offshore of the facility has been performed for the Site by a contractor. Sampling of pore water was hampered by very fine sediments that clogged the sampling apparatus and prevented collecting sufficient sample volumes. This sampling was primarily confined to locations offshore of the Delaware Valley Works facility. Part of the remediation plan is to set a reactive barrier/marine mattress system along the river bottom just offshore of the facilities and EPA is concerned that the pore water contaminants may affect the effectiveness of the reactive barrier.

The USACE will conduct pore water sampling at nine locations at points selected by EPA. See EPA Figure 1 for locations. The samples will be submitted to USACE's contract laboratory for chemical analysis. The sampling program will be implemented by the USACE following site-specific pore water sediment sampling protocols.

A. Objective

The objective of this sampling and analysis program is to obtain chemical characterization data for pore water within the offshore area planned for remediation activities.

B. Sampling Locations

EPA has identified nine locations for pore water sampling. USACE will attempt to collect the samples at or close to these locations. Some near shore locations may have shoreline protection rip rap that would preclude sampling apparatus from reaching sediments.

II. SAMPLING

A. Sampling Time Frames

Sampling and analysis is projected to be completed in September of 2018. Sample collection will likely take several days due to a number of factors including weather, wave action, tides, and sediment grain size. Sampling personnel will be transported to the selected locations on the USACE Survey Boat from the USACE Fort Mifflin Office. SGS Accutest Laboratory (NJ) will be performing the analyses of the pore water samples.

B. Sampling and Analysis Plan

All pore water samples will be analyzed by SGS Accutest, a Department of Defense NELAP accredited laboratory. All analyses will be performed using USEPA SW-846 methods of

analysis. All Quality Control (QC) samples collected for the project will be handled in a manner similar to the routine samples, and transported to the laboratory for analysis. The planned QC samples include the following:

- One set of Matrix Spike/Matrix Spike Duplicates (MS/MSD) , and;
- One rinsate blank sample.

Selection of the specific location for collection of the MS/MSD sample will be determined in the field and based upon the volume of pore water the various locations yield to ensure that sufficient volume is obtained for these QC samples.

Table 1 presents the analytes and analytical methods. Table 2 presents the type of container, preservation, and holding time for the various analytes.

C. Chain-of-Custody Procedure

The chain-of-custody procedure tracks the possession and handling of individual samples from the time of field collection through laboratory analysis. The chain-of-custody procedure will consist of:

- Individual sample identification
- Sample labeling
- Sample preservation and storage
- Documentation
- Chain-of-custody record
- Sample analysis request form

D. Sample Identification

Unique sample numbers will be assigned to identify and describe each sample. The pore water samples will be identified and tracked by location.

The matrix spike samples will be identified by including “MS” or “MSD” after the sample location. Rinsate blank samples will be identified using the term “Rinsate”.

E. Sample Labeling

Each sample container will be clearly labeled using an indelible ink pen on durable adhesive labels. The following information will be noted on each label:

- Project name
- Unique sample number (location) MS or MSD when required.

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- Date and time of collection

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- Name of the sampler

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- Analysis to be performed

Dissolved Arsenic

F. Sample Collection and Handling

All pore water samples will be collected using the following procedures:

1. The operator of the survey boat will maneuver the craft into the area designated for the collection of a given sample. A Global Positioning System (GPS) instrument will be used to locate the sampling points.
2. The MHE pore water sampler (PushPoint) will be deployed to a depth of 15 centimeter and the sampling team will attempt to collect the sample for laboratory analysis. The time allotted for sampling will be limited to one hour per location.
3. Samples for dissolved arsenic will be collected first, followed by pesticides, then total arsenic following the Standard Operating Procedure developed for this project with the assistance of the manufacturer.
4. Complete the sample label and chain of custody form (if not done in advance).
5. Place the sample bottles in the insulated cooler and pack with ice to cool the samples to approximately 4°C.

Equipment decontamination

Decontamination will be performed prior to the reuse of the PushPoints. Three sets of sampling equipment will be obtained to limit or eliminate the need to decontaminate the equipment afloat. The decontamination procedures are included in the SOP.

G. Sample Storage and Preservation

Sample bottles will be supplied by the laboratory for the sampling event and will include the appropriate preservatives, as required. Sample containers will be kept closed until each is to be filled. Sample containers will be filled in accordance with prescribed methods and capped immediately thereafter. Immediately following collection, samples will be labeled as described above and placed into an insulated cooler and packed with ice to cool them to approximately 4°C. Sample container will be padded with appropriate materials prior to shipping or transport to the laboratory. The samples will be kept stored on ice until transported to the laboratory. Samples will be delivered to the laboratory the day after sample collection via laboratory pickup or FedEx shipment.

H. Documentation

The same information noted on the sample labels will be recorded in the field book along with sampling method, sample conditions and observations. Any available documentation for the various locations, like Global Position System (GPS) coordinates, will also be recorded in the field notebook. Surveys will provide GPS coordinates. A table of EPA requested coordinates and the actual sample coordinates will be included in the final report.

I. Chain-of-Custody Form

A chain-of-custody form will be completed by the field staff and will accompany the samples in a zip top type plastic bag secured to the underside of the cooler lid. Upon transfer of sample possession to subsequent custodians (the analytical laboratory), the chain-of-custody

form will be signed by the persons transferring and accepting custody of the samples. The cooler lid will be secured using plastic or fiberglass reinforced tape with a custody seal. The condition of the samples will be recorded by the receiver. Chain-of-custody records will be included in the analytical report prepared by the laboratory. The chain-of-custody form will contain the following information:

- Sample number
- Date and time of sample collection
- Sample type/media
- Number of containers
- Parameters requested for analysis
- Signature of sample collector
- Signature of persons involved in the chain of possession

TABLE – 1 Analytical Methods

Method	Analyte Fraction
SW-846 Method 8081	Select TCL Pesticides; gamma-BHC (lindane), alpha-BHC, beta-BHC, delta BHC,
SW-846 Method 6020	Total and Dissolved Arsenic

TABLE – 2 Sample Containers, Preservation Methods and Holding Times

Description	Container	Preservation	Holding Time
Select Pesticides	Pore Water and Rinsate – 2-300 mL amber glass	Cool to 4°C	7 days/extraction, 40 days analysis
Dissolved Arsenic	Pore Water and Rinsate – 1-500 mL plastic	Cool to 4°C and HNO ₃	6 months
Total Arsenic	Pore Water and Rinsate – 1-500 mL plastic	Cool to 4°C and HNO ₃	6 months
Note: Smaller sized sample containers of the appropriate material (i.e., glass or plastic) with required preservatives will be available if a sampling location does not yield sufficient pore water to fill the standard size containers.			

III. LABORATORY AND PROJECT REPORTING

A. Laboratory Reporting Requirements

The laboratory will be required to submit the following summary data and QC information, as well as all other laboratory quality control data:

- Cover letter for each sample batch that includes a summary of any quality control sample, shipment or analytical problems, as well as documentation of internal decisions. Problems will be outlined and final solutions documented.
- A copy of the signed chain-of-custody form for each batch of samples.
- Sample concentrations reported on standard data sheets in proper units and to the appropriate number of significant figures. For undetected values, the lower limit of detection for each compound will be reported separately for each sample.
- Dates of sample extraction and analysis.
- Method blank results (at least one per batch).
- Matrix spike/matrix spike duplicate/laboratory duplicate results, including percent recoveries, spike levels, and relative percent differences for duplicates.
- Laboratory control sample results, including percent recoveries, spike levels, and relative percent differences for duplicates.

B. Field Documentation

Accurate documentation of field activities (e.g. sampling location coordinates, river conditions, comparative river water and pore water measurements of pH, temperature, dissolved oxygen, specific conductivity) will be maintained using field logbooks, field data forms, correspondence records, and photographs. Entries will be made in sufficient detail to provide an accurate record of field activities without reliance on memory. Field log entries will include a chronological description of task activities, names of individuals present during sampling event, and weather conditions, etc. Entries will be legibly entered in ink, dated and initialed.

C. Project Reporting

A brief report presenting a summary of the field work and laboratory results will be written and forwarded to EPA after receipt of the laboratory results. The report will include copies of all field documentation and the complete laboratory reports.

D. Data Management

Field measurements and laboratory data will be entered into a computerized database, and verified for consistency and correctness.

IV. SAFETY

A. Site Safety

USACE and its contractors shall adhere to the USACE Safety and Health Manual (EM 385-1-1) in completion of all field activities. Sampling team will not collect samples from locations where their safety may be impacted by adverse weather, river or submerged conditions or other potentially dangerous situations. The sampling team will prepare and utilize Activity Hazard Analysis forms for aspects related to the sampling activities.